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## Citation

Hivert, Marie-France, Ana Sofia Warner, Peter Shrader, Richard W. Grant, and James B. Meigs. 2009. Diabetes risk perception and intention to adopt healthy lifestyles among primary care patients. *Diabetes Care* 32(10): 1820-1822.

## Published Version

doi://10.2337/dc09-0720

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# Diabetes Risk Perception and Intention to Adopt Healthy Lifestyles Among Primary Care Patients

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**OBJECTIVE** — To examine perceived risk of developing diabetes in primary care patients.

**RESEARCH DESIGN AND METHODS** — We recruited 150 nondiabetic primary care patients. We made standard clinical measurements, collected fasting blood samples, and used the validated Risk Perception Survey for Developing Diabetes questionnaire.

**RESULTS** — Patients with high perceived risk were more likely than those with low perceived risk to have a family history of diabetes (68 vs. 18%;  $P < 0.0001$ ) and to have metabolic syndrome (53 vs. 35%;  $P = 0.04$ ). However, patients with high perceived risk were not more likely to have intentions to adopt healthier lifestyle in the coming year (high 26.0% vs. low 29.2%;  $P = 0.69$ ).

**CONCLUSIONS** — Primary care patients with higher perceived risk of diabetes were at higher actual risk but did not express greater intention to adopt healthier lifestyles. Aspects of health behavior theory other than perceived risk need to be explored to help target efforts in the primary prevention of diabetes.

*Diabetes Care* 32:1820–1822, 2009

Many clinical trials have shown that healthier lifestyles leading to modest weight loss can prevent diabetes in populations at risk (1,2), but changing behavior in real-life patients remains a challenge. Risk perception is a major component of most health behavior theories (3). Perceived risk to develop diabetes can be measured using a validated questionnaire such as the Risk Perception Survey for Developing Diabetes (RPS-DD) (4). There are no reports of diabetes risk perception estimated by the RPS-DD in primary care settings. We tested the hypotheses that primary care patients who perceive themselves at higher risk are 1) actually at higher risk for future diabetes and 2) more likely to intend to adopt healthier lifestyle behaviors.

## RESEARCH DESIGN AND METHODS

We invited patients from the Massachusetts General Hospital Internal Medicine Associates primary care practice to participate. After obtaining written informed consent, we performed standardized measures of anthropometry, resting blood pressure, and fasting blood glucose. We used a validated electronic health record algorithm (M.F.H., R.W.G., P.S., J.B.M., unpublished data) to recruit patients at actual low, moderate, and high risk but who were not particularly aware of their personal risk. We used the validated RPS-DD (4) with added questions regarding intention to change behaviors. We report here results of 150 patients with complete clinical and questionnaire data. Details of the study participants and recruitment are provided in the supple-

mental methods, available in an online appendix at <http://care.diabetesjournals.org/cgi/content/full/dc09-0720/DC1>.

## Statistical analysis

We dichotomized perceived risk of getting diabetes (4-point scale): patients who answered 1 or 2 were considered at low risk, whereas those who answered 3 or 4 were considered at high risk. Data non-normally distributed were transformed as appropriate. We compared the two groups using  $\chi^2$  tests for proportions and two-sided  $t$  tests for means using SAS (SAS v. 9.1; SAS Institute, Cary, NC), with two-sided  $P$  values  $< 0.05$  indicating statistical significance.

**RESULTS** — Patients who perceived themselves to be at high risk of developing diabetes were more likely to be women (69 vs. 44%;  $P = 0.005$ ) and to have self-reported family history of diabetes (68 vs. 18%;  $P < 0.0001$ ) but did not otherwise differ compared with patients with low perceived risk (supplemental Table S1). Patients with high perceived risk had higher measured metabolic risk factors (anthropometric and biochemical measurements; supplemental Table S1). Patients with high perceived risk were at higher actual risk to develop diabetes according to the Framingham Heart Study diabetes risk score (4.97 vs. 2.37% 8-year cumulative incidence of diabetes;  $P = 0.002$ ) (5) and to meet criteria for metabolic syndrome (52.9 vs. 35.4%;  $P = 0.04$ ). Only four patients (2.7%) reported having received a diagnosis of metabolic syndrome (two with low and two with high risk). Metabolic syndrome was strongly associated with perceiving oneself at high risk for diabetes, even when adjusting for age, sex, and family history (odds ratio 5.6 [95% CI 2.0–15.6]). RPS-DD subscore data are presented in supplemental Table S2.

Regarding diet, physical activity, or weight management, we observed no difference between groups in reported previous efforts over the last year or in intentions over the coming year (Table 1; all  $P > 0.05$ ). In both groups, the majority of patients agreed that lifestyle changes could prevent diabetes, with the benefits

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Received 15 April 2009 and accepted 6 July 2009.

Published ahead of print at <http://care.diabetesjournals.org> on 10 July 2009. DOI: 10.2337/dc09-0720.

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**Table 1—Self-reported health behaviors over the previous year, intentions of adopting healthy lifestyles in the coming year, and general opinions about treatments to prevent diabetes in 150 primary care practice patients**

	Low perceived diabetes risk*†	High perceived diabetes risk*†	P
n	99	51	
“Over the past year . . . †			
I made conscious food choices to improve my diet.”	82.8	82.4	0.94
I chose to be active to improve my health.”	82.8	84.3	0.82
I lost weight.”	44.4	41.2	0.70
“In the coming year . . . †			
I will make food choices to improve my diet.”	90.8	98.0	0.10
I will increase my activity level.”	89.7	90.2	0.92
I will lose weight.”	79.6	84.3	0.48
Opinions about treatments to prevent diabetes†‡			
Pills can prevent diabetes from developing.	32.3	28.0	0.59
The benefit of taking pills to prevent diabetes is greater than the effort to take these pills.	69.2	82.4	0.08
Taking pills to prevent diabetes would be inconvenient.	13.5	11.8	0.76
Doing regular exercise and following a diet takes a lot of effort.	55.7	78.4	0.006
Regular exercise and diet can prevent diabetes from developing.	91.8	84.3	0.17
The benefits of following a diet and exercise program are greater than the effort to do so.	87.6	86.0	0.78
Intentions and motivations to change lifestyle§			
In the coming year, what is the likelihood that you will change your lifestyle to adopt a healthier diet and increase physical activity?	29.2	26.0	0.69
Now imagine that your doctor tells you that you are at high chance for developing diabetes and advises you to eat a healthier diet, lose weight, and increase your physical activity. How likely is it that you would do what the doctor suggests if s/he tells you that your chance of getting diabetes is increased because of:			
Your family history?	61.2	45.1	0.06
Your high body weight and low level of physical activity?	60.2	47.1	0.13
The results of some blood tests?	60.2	54.9	0.50
Metabolic syndrome?	57.9	55.1	0.75
The results of some genetic tests?	61.2	51.0	0.23

Data are percentages. \*Based on the question specific to diabetes in the section Your Attitudes about Health Risks in the validated questionnaire RPS-DD: patients answering “almost no risk” or “slight risk” were classified as low; patients answering “moderate risk” or “high risk” were classified as high. †Patients who answered “agree” or “strongly agree” (4-level scoring scale). ‡Questions from the RPS-DD validated questionnaire not part of the scoring system. §Patients who answered “very likely” (i.e., 1 on a scale from 1 to 6).

greater than the efforts. On the other hand, patients with a high perceived risk were more likely to believe that “Doing regular exercise and following a diet takes

a lot of effort” ( $P = 0.006$ ). In the hypothetical situations, there was no difference in intentions to change lifestyle overall in the coming year according to perceived

risk for diabetes, modified by specific risk factors (Table 1).

**CONCLUSIONS**— We demonstrated that primary care patients with high perceived risk to develop diabetes actually are at higher risk, measured by the Framingham Heart Study diabetes risk score or by metabolic syndrome characteristics. Despite high perceived risk, those patients did not intend to modify their lifestyle more than the patients with low perceived risk.

Using the validated RPS-DD, 34.0% of primary care patients considered themselves at high risk, which fits well in between populations considered at lower (27% for nondiabetic physicians [6]) and higher (56.7% in women with history of gestational diabetes [7]) risk and nearly 80% of the Diabetes Prevention Program participants (8) based on previous reports using the same questionnaire. In our population, high perceived risk was associated with being a woman or having a positive family history of diabetes, consistent with other literature (7,9).

We noted that high perceived risk was associated with higher actual risk, despite the very uncommon formal metabolic syndrome diagnosis (2.7% self-reported). Based on health behavior theories (3), we expected higher perceived risk to lead to higher intentions to adopt healthy behavior, but this was not the case. We need to explore other aspects of health behavior theories to improve adoption of healthier lifestyles in high-risk patients.

Strengths include data from directly phenotyped patients to measure actual risk and from a validated questionnaire to measure perceived risk (with high internal validity in our sample). To address limitation of the cross-sectional design, we asked patients their intentions of modifying health behaviors: intentions have been shown to be moderately related to future health behaviors (10,11). Bias of desirability is likely to have reduced differences between the groups. Participants were recruited as part of a study about risk for future diabetes and may have been relatively more health conscious than nonparticipants (as illustrated by high reporting of recent behavior changes); difference in intentions might have been reduced by this fact. Our population is middle-aged, mainly Caucasian, and well educated, perhaps limiting generalizability of results to other populations.

In summary, we have shown that pri-

primary care patients with high perceived risk are at actual higher risk of developing diabetes. Unfortunately, intentions to adopt healthy lifestyles were not increased in patients with high perceived risk, even if the majority of patients agreed about the benefits of healthy diet and exercise to prevent diabetes. Diet and physical activity are complex behaviors; it is likely that more than perceived risk is implicated in intention to change. Primary prevention of type 2 diabetes will require exploration of other aspects of individual health behavior modification as well as strategies at the community level.

**Acknowledgments**— This study was funded by the Massachusetts General Hospital Clinical Research Program, an American Diabetes Association Career Development Award (to J.B.M.), and National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) Grant K24 DK080140 (to J.B.M.). M.F.H. was supported by the Centre de Recherche Medicale de l'Universite de Sherbrooke and a Canadian Institute of Health Research Fellowships Health Professional Award. R.W.G. was supported by NIDDK Grant K23 DK067452.

J.B.M. currently has research grants from GlaxoSmithKline and sanofi-aventis and has

served on consultancy boards for Eli Lilly, Interleukin Genetics, Kalypsis, and Outcomes Sciences. No other potential conflicts of interest relevant to this article were reported.

We thank Elizabeth Walker for her wise advice on the use, scoring, and analysis of the RPS-DD questionnaire. We thank the administrative and secretarial staff from the Massachusetts General Hospital Internal Medicine Associates for logistical help.

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